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REMARKS

The Advisory Action dated January 21, 2004 has been carefully considered and this Reply prepared in response. Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks.

After amending the claims as set forth above, claims 10, 12, 16-17, and 19-31 are now pending in this application; of these, claims 16, 19-22 and 26-27 are non-elected.

Applicants submit that the Application is in condition for allowance for the reasons that follow.

New Claims

Applicants provide new claims 28 – 30 in view of the allegation that trace amounts of TiO₂ are present in the references cited in previous office actions, thus rendering claim 10, as written prior to this paper, unpatentable in the opinion of the PTO.

New claim 28, which parallels claim 10 as written prior to this paper, recites the method step of “***substantially*** reducing a corrosion potential of the reactor structural member.” (Claim 28, emphasis added.) Also, a recitation that the corrosion potential reducing substance is “introduced into the reactor with the water” is present in the claim. Thus, for a reference to anticipate or render obvious claim 28, any TiO₂ added to water of a reactor must make a substantial impact (i.e., reduce corrosion in, for example, by an economically sufficient amount) on corrosive effects of a reactor. Any trace amounts of TiO₂ alleged to be present in the cited references do not meet this recitation.

Claim 29 recites that substantial quantities of particles made of TiO₂ are present in the corrosion potential reducing substance. Again, this places the claim outside possible anticipation by a reference that may have trace amounts of TiO₂ present in an additive to water of a reactor.

Claim 30 recites that “a solution or a suspension of a composition containing the photocatalytic substance is added to the water of the reactor ***to form a film*** of the

photocatalytic substance on the structural member *as a result of the addition of the solution or suspension to the water of the reactor.*” (Emphasis added.) There is no film of TiO₂ in the Hettiarachchi references. There cannot be, because the alleged trace amounts of TiO₂ are not significant enough in quantity to form a film. Claim 31 is likewise allowable.

Grounds For Rejection Presented In The Advisory Action

In the Advisory Action, it appears that all of the claims stand rejected under 35 U.S.C. §102(b) as being anticipated by Hettiarachchi-I (USP 5,818,893) and Hettiarachchi-II (USP 5,904,991), as well as Skarpelos (USP 5,028,384). In response, Applicants have made the above amendment to independent claim 10, and respectfully submit that claim 10, as amended, and its dependent claims, are allowable.

Applicants rely on MPEP § 2131, entitled “Anticipation – Application of 35 U.S.C. 102(a), (b), and (e),” which states that a “claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” It is respectfully submitted that neither of the Hettiarachchi references describe each and every element of amended claim 10, and thus the claims that depend therefrom.

The Claims, As Amended, Are Allowable Over The Hettiarachchis: Claim 10, as amended, recites a method of suppressing corrosion of a reactor structural member including forming photocatalytic substances formed as particles made of TiO₂ *prior* to introducing the particles into the water of the reactor, and adding the photocatalytic substance to the water of the reactor to either (A) “*make* the photocatalytic substance *adhere to the surface* of the reactor structural member or” (B) “*to form a film of the photocatalytic substance on the surface* of the reactor structural member.” (Emphasis added.) That is, TiO₂, a photocatalytic corrosion potential reducing substance, is formed separate from the water of the reactor, and then introduced into the water via inclusion into a solution or suspension in sufficient quantities so that the TiO₂ will form a film on or adhere to the surface of the reactor structural member.

In contrast, neither of the Hettiarachchi references disclose, teach, or suggest either (A) or (B). The Office Action asserts that because the Hettiarachchis teach the addition of Titanium of metal (even though they do not teach the addition of TiO_2) into the water of a reactor, trace amounts of TiO_2 are inherently added in the Hettiarachchis, and that “any amount of TiO_2 , even a single atom, will control (and cannot be prevented from controlling) to some degree the corrosion potential of the reactor.” (See August 2003 Office Action, pages 3-4, and Advisory Action, page 2.) Assuming *arguendo* that this is correct, the trace amount of TiO_2 still will not either (A) “*make the photocatalytic substance adhere to the surface of the reactor structural member or*” (B) “*to form a film of the photocatalytic substance on the surface of the reactor structural member.*”

Regarding requirement (A), the Hettiarachchis teach that a metal oxide film is present, *prior to* the introduction of Titanium of metal, on the structural members. (See Hettiarachchi '893, col. 4, lines 45-50; and Hettiarachchi '991, col. 4, lines 48-54.) In the Hettiarachchis, Ti, *after decomposition*, bonds with the oxide film already present. Therefore, the TiO_2 present in the solution of Titanium of metal added (alleged in the Office Action as satisfying the recitation of providing a photocatalytic substance formed as particles made of TiO_2 prior to introduction into water of the reactor) does not adhere to the surface of the reactor structural member because it will not bond with the film of metal oxide, which is *already present* on the structural member. Only Ti after decomposition (i.e., free of the TiO_2 component), will it bond with the metal oxide film layer, and Ti alone is not a photocatalytic substance.

Regarding requirement (B), assuming *arguendo* that there are trace amounts of TiO_2 present in the solution of Titanium of metal added in the Hettiarachchis, the trace amounts are not enough to form a film of TiO_2 as a photocatalytic substance on the structural members of the reactor. Thus, neither requirement (A) nor requirement (B) are met by the teachings of the Hettiarachchis, and the claims are allowable for at least this reason.

* * * * *

Applicants recognize that the object of the Hettiarachchis and the present invention are concomitant with each other: reducing the corrosion of reactor structural members. However, in the technology of the Hettiarachchis, the means for achieving the object and the principle thereof are totally different from those of the present invention.

The Hettiarachchis teach the injection of a compound that decomposes to release atoms and ions. In the Hettiarachchis, the atoms and ions, such as Ti and Zr, that are released are incorporated in the oxide film discussed above on the surface of the reactor structural members. Such a film is shown in Fig. 1A of Exhibit I attached to the end of this paper.

In contrast, in the present invention, titanium dioxide is injected into water of the reactor. This is diametrically opposite to what is occurring in the Hettiarachchis, since titanium dioxide cannot be used in the Hettiarachchis to practice the methods taught therein, as it is highly stable and does not decompose in water of a nuclear reactor to release atoms or ions of titanium.

The principle anti-corrosion mechanism in the Hettiarachchis is based on the “mix potential theory.” Namely, a corrosion potential is lowered by an increase of an anode current which is generated by the oxidation of atoms of Ti incorporated in an oxide film formed on a reactor structural member. Thus, Ti atoms, not titanium dioxide, must be present in the oxide film. In other words, according to the anti-corrosion mechanisms in the Hettiarachchis, when titanium dioxide is present in the oxide film, no anti-corrosion effect can be obtained. This principle is further described in Exhibit II at the end of this paper.

Conversely, the present invention utilizes titanium dioxide as a photocatalyst. As shown in Fig. 1B in Exhibit I, when titanium dioxide is irradiated by light, electrons (e-) and positive holes (H+) are formed in a manner conducive to current flow. That is, a “photoexcitation current” is utilized to reduce corrosion. The differences between the Hettiarachchis and the present invention are summarized in the table below.

	Hettiarachchi	Present Invention
Substance to be Injected	Compound that decomposes by heat and radiation in water of reactor to release atoms and ions of Ti and Zr	titanium dioxide (that does not decompose to release atoms and ions in water of reactor)
Anti-corrosion Principle	Anti-corrosion technique utilizing a current generated by oxidation of atoms in oxide film, based on mix potential model No anti-corrosion effect is obtained by titanium dioxide.	Anti-corrosion technique utilizing a photoexcitation current using titanium dioxide as a photocatalyst

The Claims, As Amended, Are Allowable Over Skarpelos: As seen above, claim 10 stands amended. The ramifications of this amendment are detailed above, and are thus hereby referred to by reference. The Office Action asserts Skarpelos teaches surfacing or plating structural members in a reactor, with a catalytic oxidizing metal such as titanium dioxide “*during the manufacturing or before the installation stage.*” (Advisory Action, paragraph 3, emphasis added.) The Office Action asserts that the mere presence of a titanium dioxide film acts to reduce corrosion, even though Skarpelos is silent in regard to an anti-corrosion effect obtained by titanium dioxide.

Assuming *arguendo* that the assertions of the Advisory Action are indeed correct, Skarpelos still does not anticipate or otherwise render amended claim 10 unpatentable. First, Skarpelos fails to teach that “a solution or a suspension of a composition containing the photocatalytic substance [i.e., TiO₂] is added to the water of the reactor,” as claim 10 now specifically recites. As the Office Action asserts, any TiO₂ present in Skarpelos is not added in the manner claimed. Instead, it is formed on surfaces before reactor installation.

Second, the object of Skarpelos vis-à-vis the titanium dioxide present in that reference is to reduce the amount of radioactive nitrogen transferred into a nuclear reactor turbine. Skarpelos teaches the steps of adhering titanium dioxide to a surface of a reactor structural member and oxidizing volatile nitrogen compounds such as ammonia in the water of the

reactor by the catalytic effect of titanium dioxide so as to convert the volatile nitrogen compounds to non-volatile forms such as nitric acid ions. Thus, the object of Skarpelos is totally different from that of the present invention. Indeed, Skarpelos is completely silent in a teaching that anti-corrosion effects are obtained by titanium dioxide. Moreover, Skarpelos does not mention any specific method of adhering titanium dioxide to a surface of the reactor structural member. In contrast, in the present invention as claimed, “a solution or a suspension of a composition containing the photocatalytic substance is added to the water . . . to make the photocatalytic substance adhere to the surface of the reactor.” Accordingly, the present invention and Skarpelos are totally different from each other with respect to both constitutions and objects thereof. The table below provides a summary of the differences between Skarpelos and the present invention.

	Skarpelos	Present Invention
Object	Control of transfer of radioactivity to nuclear reactor turbine	Anti-corrosion of reactor structural member
Principle	Oxidizing volatile radioactive nitrogen compounds in water of reactor by catalytic effect of titanium dioxide so as to convert the volatile compounds to non-volatile compounds	Suppressing corrosion potential of reactor structural member by using photoexcitation current generated by catalytic effect of titanium dioxide
Method	Adhering titanium dioxide to surface of reactor structural member No specific method of adhesion is disclosed. Alternatively, metal oxide sponge may be disposed in water of reactor.	Adding a solution or a suspension containing titanium dioxide to water of reactor

Rejoinder Of The Withdrawn Claims

Applicants request that, upon the allowance of claim 10, the withdrawn claims dependent from claim 10 be rejoined and allowed.

Rejections Under 35 U.S.C. § 102 Presented In The Prior Office Action

Claims 10 (the independent claim from which each of the elected claims depend), 14, 15, 17, 18, and 25 stood rejected under 35 U.S.C. §102(b) as being anticipated by the Hettiarachchi. As seen above, Applicants have amended claim 10. Applicants also present the pertinent arguments made in the last response as to the allowability of claim 10 to maintain those arguments on the record.

Claim 10 recites that the method of suppressing corrosion of a reactor structural member includes forming photocatalytic substances formed as particles made of TiO_2 *prior* to introducing the particles into the water of the reactor. That is, TiO_2 , a photocatalytic corrosion potential reducing substance, is formed separate from the water of the reactor, and then introduced into the water.

In contrast, neither of the Hettiarachchi references disclose, teach, or suggest introducing TiO_2 into the water of the reactor. The Office Action asserts that the disclosure in the Hettiarachchi references of “a platinum compound being in an aqueous solution or suspension” correlates to an “inherent” formation of TiO_2 in Hettiarachchi’s mixture of platinum and titanium, citing columns 5, lines 48+ and lines 50+ in Hettiarachchi ’893 and ’991, respectively. However, in each of the cited sections, immediately after teaching the relied on aqueous solution, each of the Hettiarachchi references state that “when the metal compound solution or suspension enters the high temperature water, the compound **decomposes very rapidly** to produce atoms/ions and the metal (or metals) is incorporated into the metal oxide film.” (Hettiarachchi ’893, col. 5, lines 50-55; Hettiarachchi ’991, col. 5, lines 53-58; emphasis added.) That is, the metal compound or solution (e.g., titanium) must be able to decompose in high temperature water, such as reactor water, to release atoms of the metal. If the metal cannot decompose, no atoms/ions will be released.

Applicants respectfully assert that if titanium is transformed into TiO_2 before introduction into the reactor water as is asserted in the Office Action, atoms/ions will not be released, since TiO_2 is too stable to decompose, even when exposed to the high temperature of reactor water. Therefore, a substantial amount, indeed, the vast majority, of the titanium introduced into the reactors of the Hettiarachchi references must not be in the form of particles made of TiO_2 so that the solution can decompose in the reactor water to release

atoms. Thus, the Hettiarachchi references teach away from forming TiO_2 prior to introduction into the water of the reactor.¹

Still further, assuming *arguendo* that some of the titanium in the solution of the Hettiarachchi references is transformed into TiO_2 , the amount will be too small to perform the function of a photocatalytic corrosion potential reducing substance as claimed. Claim 10 recites a method of “controlling a corrosion potential of the reactor structural member by providing . . . a photocatalytic substance . . . being formed as particles of TiO_2 .” Even if some of the titanium of the Hettiarachchi reactors were converted to TiO_2 , the quantity would be far too small to control a corrosion potential of the reactor, as is required to anticipate claim 10. Therefore, even if trace amounts of TiO_2 are accidentally formed by practicing the Hettiarachchi methods, a photocatalytic substance is still not used to control a corrosion potential of the reactor. Indeed, the introduction of TiO_2 into the reactors of Hettiarachchi is to be avoided, since, as discussed above, TiO_2 is too stable to decompose to transfer atoms per the references’ teachings. Moreover, because the Hettiarachchis teach introduction of titanium as a metal (not as TiO_2) into the “aqueous solution,” the trace amounts of TiO_2 allegedly inherently formed in the Hettiarachchis are of an uncontrolled particle size and have an uncontrolled crystal structure. Since photocatalytic effects of TiO_2 are influenced by crystal structure and the size of the particle, the photocatalytic effect of any TiO_2 that may be produced by practicing the Hettiarachchi methods is not (it cannot be) controlled. In contrast, by purposely preparing TiO_2 prior to introduction into the reactor water, it is possible to control the crystal structure and particle size of the TiO_2 to obtain a sufficient photocatalytic effect. In sum, the Hettiarachchi references simply fail to teach controlling corrosion potential using a photocatalytic substance according to claim 10. Thus, claim 10 and its dependent claims are allowable for at least this reason.

* * * * *

¹ Indeed, USP 5,774,516, to the same inventor as that of Hettiarachchi '893 and Hettiarachchi '991, listed in Notice of References Cited, includes a table, “Table 1,” which shows that $\text{ZrO}_2(\text{MgO})$ results in a positive potential, i.e., +90mV(SHE). That is, Hettiarachchi '516 shows that a negative potential cannot be produced by ZrO_2 , which has similar properties to those of TiO_2 . Therefore, because TiO_2 , which has similar properties to those of ZrO_2 , cannot produce a negative potential, titanium of metal, not TiO_2 , must be used in the Hettiarachchi references to obtain corrosion control.

The Office Action concedes that the Hettiarachchi references do not contain an affirmative teaching of forming TiO₂ *prior* to introducing the particles into the water of the reactor. Recognizing this, the Office Action states that because “the platinum is in the form of an aqueous solution or suspension . . . introduction of titanium with platinum to form a mixture *inherently* produces TiO₂.”(Office Action, page 5, lines 5-7, emphasis added.) Applicants respectfully rely on MPEP § 2112, which states that while “a rejection under 35 U.S.C. §102/103 can be made when the prior art product seems to be identical except that the prior art is silent to an inherent characteristic,” the “[E]xaminer *must* provide rationale or evidence tending to show inherency.” (MPEP § 2112, subsections 3 and 4, emphasis added.) It is respectfully submitted that no evidence tending to show inherency has been provided in the present Office Action. Further, it is respectfully submitted that § 2112 inherency is not being properly implemented. In arriving at this conclusion, Applicants provide the following excerpt from MPEP § 2112:

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijkaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). “To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently.)

(Emphasis added.) Inherency means that *the missing descriptive matter is necessarily present* in the reference. The courts have allowed the PTO to rely on inherency arguments to free the

PTO from the necessity of finding references which explicitly state that inherent elements are present. This is because certain characteristics are inherent, the references will most probably not mention these elements, and, as such, will be difficult to find. For example, it is not necessary to find a reference that explicitly states that plutonium 239 is radioactive, as plutonium 239 is always radioactive. That is, radioactivity is an inherent feature of plutonium 239. However, inherency is not a panacea that enables the PTO to use references which are *deficient* in teaching certain elements of a claim. Recognizing the power of the inherency argument, the courts have tempered its use, as is seen in § 2112, where the PTO has stipulated that the PTO must follow certain procedures before invoking inherency: the “examiner must provide rationale or evidence tending to show inherency.” In the present case, no such rationale or evidence has been provided in the Office Action. The statement that “introduction of titanium with platinum to form a mixture inherently produces TiO_2 ” does not satisfy the PTO’s burden to provide rationale or evidence showing that “the missing descriptive matter is necessarily present.” Just as was the case of the third fastener in the example provided in the MPEP quoted above, the subject matter of Applicants’ claims is not expressly or inherently disclosed in either of the Hettiarachchi references. Thus, a reference that provides evidence that TiO_2 is necessarily formed prior to introduction of the mixture into the feed water in the Hettiarachchi reactors must be found, else the claims must be allowed. Since the Hettiarachchi references are silent in regard to the above quoted recitation, and no evidence has been proffered to establish the inherency of the formation of TiO_2 , claim 10 and its dependencies are allowable.

* * * * *

Claim 10 also recites that “each particle [has] a surface on which at least one of Pt, Rh, Ru and Pd is provided.” Neither of the Hettiarachchi references disclose or suggest such a feature. As previously noted, the Hettiarachchis do state that *mixtures* of platinum group compounds and non-platinum group compounds may be used. However, mixtures do not denote providing Pt on a surface of each particle, as mixtures are known to one of ordinary skill in the chemical arts to be mere concoctions of various elements and compounds having no chemical bonds between them.

The Office Action asserts that Applicants have “admitted that chemical bonding may occur between platinum and titanium in Hettiarachchi’s mixture, albeit in trace amounts.” Assuming *arguendo* that chemical bonding may occur between platinum and titanium in the cited references, two recitations of claim 10 are still missing: 1) platinum (or one of the other recited elements) being provided on a surface of a particle of TiO_2 , not just Ti as, at most, would be the case in the references, and 2) utilizing the particles of TiO_2 having a surface on which platinum is provided **to control a corrosion** potential of a reactor.

Regarding the former recitation, to have platinum provided on the surfaces of particles of TiO_2 prior to introduction into the water, TiO_2 must first be formed, which, as discussed above, is not formed in the Hettiarachchis. Regarding the latter recitation, even if the former recitation is obtained in trace amounts by practicing the teachings of the Hettiarachchi references, the trace amounts are too small to be used to control a corrosion potential of a reactor, as is required by claim 10 and its dependencies.

Recognizing that the references fail to explicitly teach the recitation that platinum (or one of the other elements) is provided on the surface of the particles of TiO_2 , the Office Action asserts that because platinum is supplied in the mixture, platinum “**inherently**” adheres or coats the surface of the titanium particles of the references. However, no evidence or rationale for the inherency of this phenomenon is provided in the Office Action. Applicants respectfully direct the reader to the above discussion regarding the requirements on the PTO when proffering an inherency argument, and submit that those requirements are not satisfied in the present Office Action. Thus, claim 10 and the claims dependent from claim 10 are allowable for yet another reason.

Claim Rejections Under 35 U.S.C. §103(a) Presented In The Prior Office Action

Claims 10 (the independent claim from which each of the elected claims depend), 14, 15, 17, 18, and 25 stand 35 U.S.C. §103(a) as being unpatentable over Andersen (USP 5,608,766) in view of either of the Hettiarachchi references, and claims 12, 23 and 24 stand rejected as being unpatentable over either of the Hettiarachchi references when combined with Uetake (USP 5,377,245) or Panson (USP 4,842,812). Still further, claims 12, 23, and 24

stand rejected as being unpatentable over a Andersen-Hettiarachchi combination when combined with Uetake or Panson.

As noted above, Applicants have amended claim 10. Applicants repeat the pertinent arguments as to the allowability of these claims to maintain those arguments on the record.

Applicants rely on MPEP § 2143, which states that:

[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

It is respectfully submitted that at least the third criteria of MPEP § 2143 cannot be met in view of the cited references.

The Cited References Do Not Suggest All Claim Recitations

Even if the first requirement of MPEP § 2143 could be satisfied, the cited references still do not meet the third requirement, which is that “the prior art reference (or references when combined) must teach or suggest all the claim limitations.”

As seen above, the Hettiarachchi references do not teach each and every element of claim 10. Applicants direct the reader’s attention to the above discussion on these references in the interest of economy.

Andersen fails to remedy the deficiencies of the Hettiarachchis. Andersen, like the Hettiarachchis, does not disclose, teach, or suggest introducing TiO_2 into the water of the reactor to control a corrosion potential of the reactor utilizing a photocatalytic effect. Like the Hettiarachchis, Andersen teaches introducing Titanium into the water. Andersen does this because he expects that the Titanium will be co-deposited on the reactor component to be protected during re-growth of oxide films on the surface of the reactor component. Also like the Hettiarachchis, Andersen teaches that compounds inserted into the reactor water “**must** have the property that it **decomposes** under reactor thermal conditions to release species of the selected non-noble metal which incorporate in or deposit on the oxide film,” where the “non-noble metals which can be used are selected from the group consisting of . . . titanium.” (Andersen, col. 8, lines 46-53, emphasis added.) That is, just as is the case with the Hettiarachchis, the compounds must be able to decompose. As TiO_2 is stable even in the high temperatures of a reactor, the formation of TiO_2 is to be avoided. Applicants direct the reader to the above discussion regarding the formation of TiO_2 in the Hettiarachchi references as compared to the claimed subject matter of claim 10, and respectfully assert that the rationale for the allowability of claim 10 in view of the Hettiarachchi references is applicable to the allowability of claim 10 in view of Andersen.

Uetake or Panson do nothing to remedy the deficiencies of the Hettiarachchis or Andersen. Thus, claim 10 and its dependent claims are allowable for at least this reason, but there is more.

Andersen, like the Hettiarachchi references, also does not disclose, teach, or suggest the photocatalytic substances formed as particles having “a surface on which at least one of Pt, Rh, Ru and Pd is provided.” Andersen teaches that either noble metals and corrosion-inhibiting metals can be used, but the reference is silent in teaching that noble metals are provided on the surface of photocatalytic substances, and Uetake or Panson do nothing to remedy this deficiency. Indeed, the reference is silent in regard to even utilizing a noble metal in conjunction with a corrosion-inhibiting metal, such as Ti. Applicants again direct the reader to the above discussion of the deficiencies of the Hettiarachchi references, except this time to the discussion regarding the lack of formation of Pt, Rh, Ru and Pd on particles of TiO₂ in the Hettiarachchi references as compared to the claimed subject matter of claim 10. Thus, claim 10 and the claims dependent on claim 10 are allowable in view of Andersen for yet another reason.

In sum, even if the first requirement of MPEP § 2143 is satisfied, the third requirement of MPEP § 2143 cannot be satisfied by the references, since the cited art does not teach each and every element of the claimed invention. Thus, the present claims are allowable.

Conclusion

Applicants believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

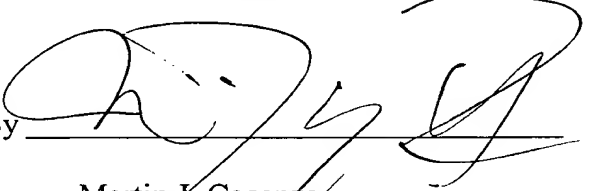
Examiner Palabrica is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

Date June 04, 2007

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By


Martin J. Cosenza
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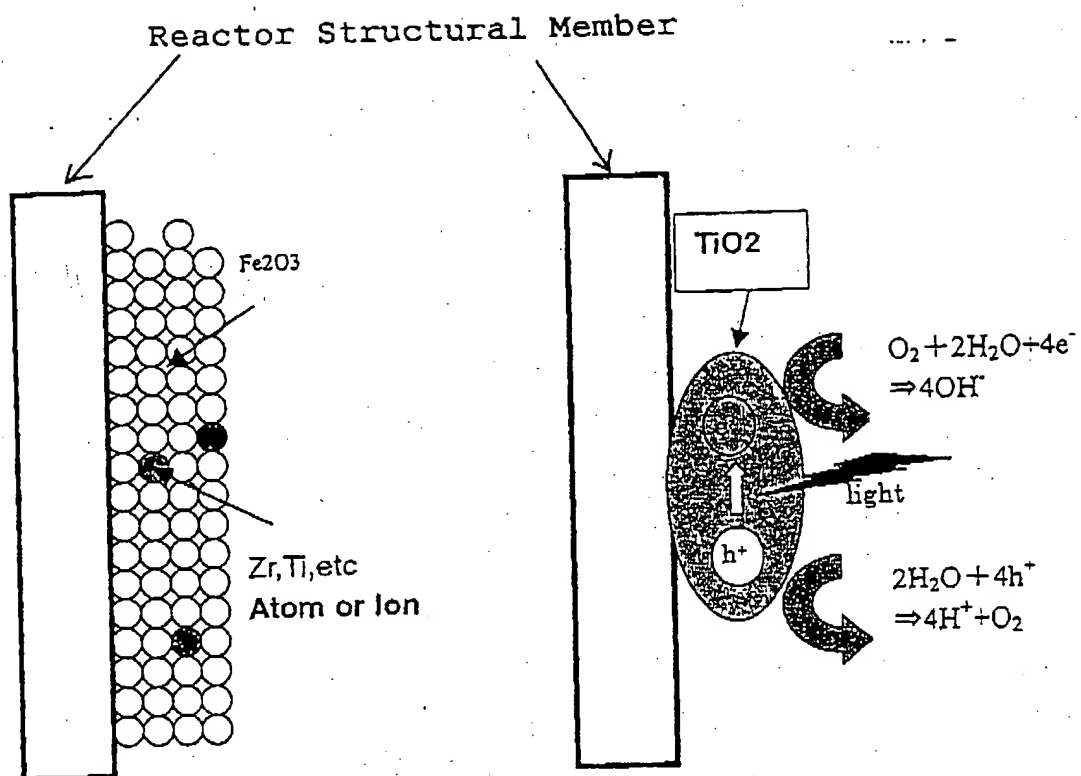


FIG. 1A (Hettiarachchi)

FIG. 1B (Present Invention)

Principles of Anti-Corrosion

Detailed Explanation about the Principles of Hettiarachchi and the Present Invention.

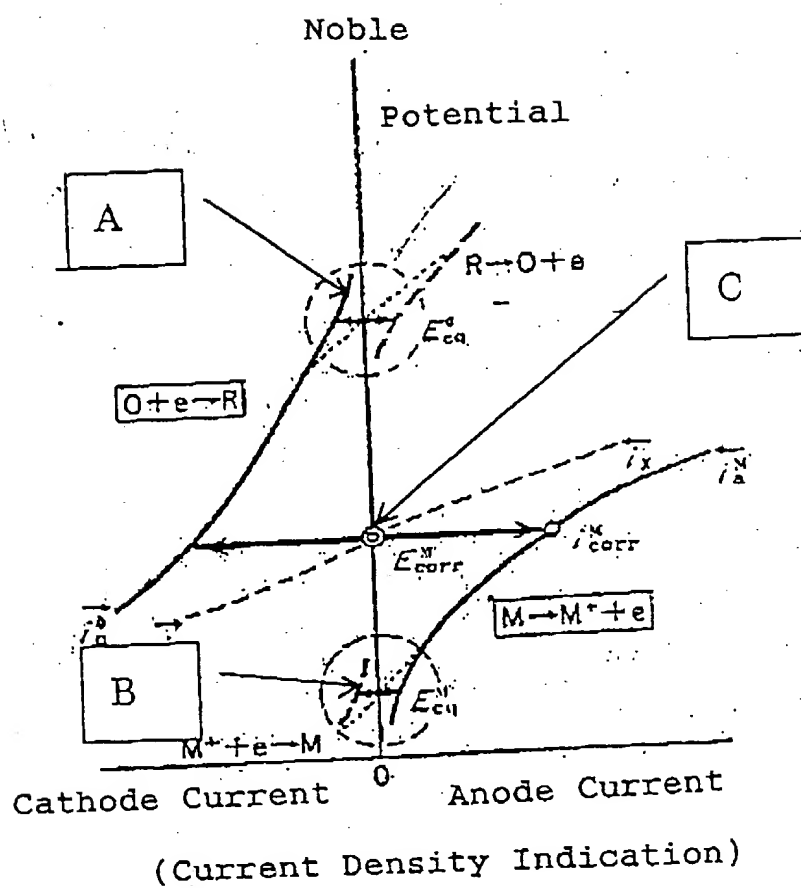
Hettiarachchis

Fig. 2a (see next page) is a view showing the principle of the mix potential model. The reference character R indicates Fe in stainless steel, and the reference character M indicates Ti.

The corrosion potential of stainless steel is determined by the corrosion potential of iron. The corrosion potential of iron is indicated by a point "A" in which the oxidation reaction and the reduction reaction of iron are balanced. The corrosion potential of titanium is indicated by a point "B" which is lower than that of iron. Thus, when metal titanium is present at the surface of stainless steel, the corrosion potential thereof moves from point "A" to a point "C" in which the sum of a current of an oxidation of iron and a current of an oxidation of titanium, and the sum of a current of a reduction of iron and a current of a reduction of titanium are balanced. In this way, the corrosion potential is lowered.

Present Invention

Fig. 2B (see last page) is a view showing the principle of anti-corrosion of the present invention. As shown in Fig. 2B, the corrosion potential of stainless steel is generally a point "A" which is an intersection of a reduction current of oxide and a corrosion current of stainless steel on a stainless steel surface. However, when titanium dioxide is present in the surface of stainless steel, a photoexcitation current flows. As a result, the intersection moves from the point "A" to a point "B", so that the corrosion potential of the stainless steel is lowered.



Principle of Mix Potential Model (Hettiarachchi)

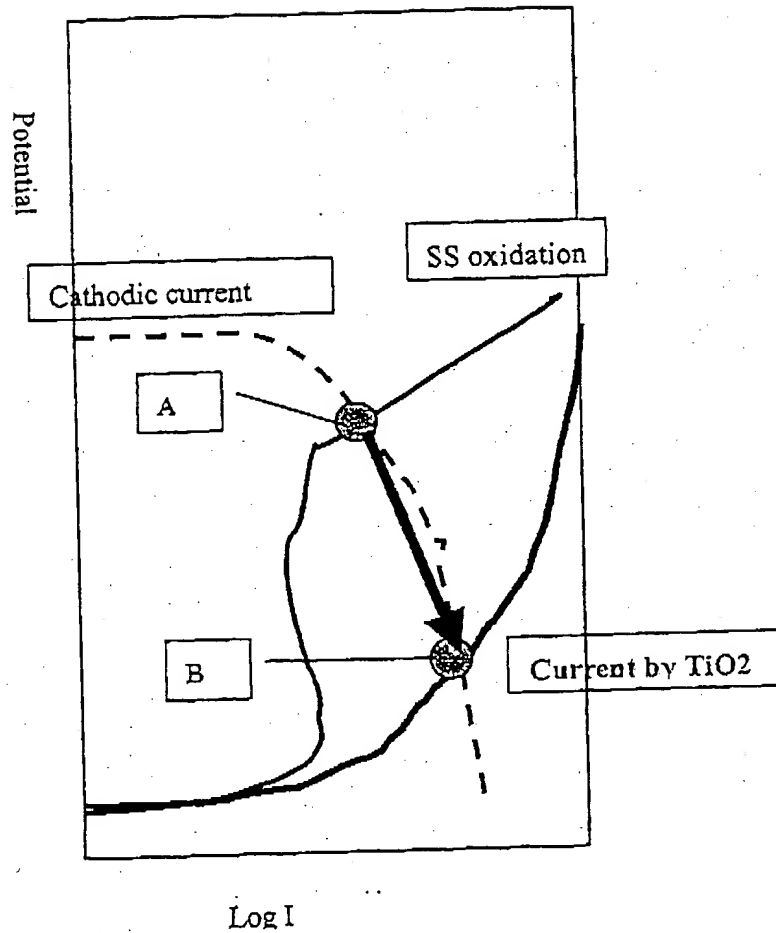


FIG. 2B

Principle of Anti-Corrosion of the Present Invention